

REMARKS

Claims 23, 25-27, 31-34 and 38-43 are presently in the application. Claims 1-22, 24, 28-30, 35-37, 44 and 45 have been canceled. Claims 31 and 43 have been amended. Claims 32 and 38 have had their dependency changed to claim 31. Claim 31 is the only independent claim remaining in the application. Applicants submit that this amendment raises no new issues.

Applicant would like to thank the examiner for the thorough consideration given to this application. In view of the cited and applied art, claim 31, the sole independent claim, has been amended to include the subject matter of dependent claim 37 and intervening claim 35. Applicants submit that the structural features recited in dependent claim 37 are neither disclosed nor suggested by the cited prior art.

Claim 31, as amended, is directed to a pressure limiting valve (10), consisting of
a single piece valve holder (1),
a single piece valve insert (2) connected to the valve holder (1),
a single piece valve piston (3) supported slidably in the valve insert (2),
a compression spring (5), acting upon the valve piston (3) with a pressure force acting in the closing direction, and

a single piece adjusting shim (4) disposed between the valve piston (3) and the compression spring (5) such that the compression spring (5) is braced on one end on a bottom piece of the valve holder (1) and on the other on a face of the adjusting shim (4) facing away from the valve piston (3), wherein the valve holder (1) is cup-shaped and has at least two subregions (1a, 1b), each with a different inside diameter (D1, D2), and the subregions (1a,

1b) merge with one another in steplike fashion, wherein the subregion (1b) of the valve holder (1) embraces the valve insert (2) from the outside, so that the steplike transition of the valve holder (1) formed by the different diameter regions (diameters D1, D2) is seated on and surrounds a portion of the valve insert (2) for establishing the connection between the valve insert (2) and the valve holder (1), wherein three flat places (3a, 3a.1, 3a.2, 3a.3) are provided on an outer circumference of the valve piston (3), which flat places are distributed uniformly over the circumference of the valve piston (3), and are disposed on the valve piston (3) such that they extend parallel to the longitudinal axis of the valve piston (3), and the valve further comprising an outflow conduit (1c) in the valve holder (1), wherein the axis (A) of the outflow opening is positioned at an angle relative to the longitudinal axis (A1) of the valve holder (1).

Claims 23, 25, 31, 33 and 34 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hirota et al (US 6,314,753) in view of Cadman et al (US 2,498,482) and Fountain-Baber (US 3,199,533).

The examiner, on pgs. 2-5 of the Final Rejection, describes Hirota et al (Fig. 2) as disclosing, inter alia, a pressure limiting valve (expansion valve 10) consisting of a single piece valve holder (seat member 20) having two sub regions with different inside diameters (neither of which is identified) and an outflow conduit (passage 22), a single piece valve insert (cylindrical case 12) connected to the valve holder, a single piece valve piston (portion of valve element 14 within smaller diameter portion of valve insert 12) supported slidably in the valve insert, a compression spring (coil spring 18) acting upon the valve piston with a pressure force in the closing direction, and a single piece adjusting shim (larger diameter

portion of valve element 14) disposed between the valve piston and the compression spring such that the compression spring (18) is braced on one end on the valve holder (20) and on the other end on a face of the adjusting shim facing away from the valve piston.

The examiner recognizes that Hirota et al fail to disclose that the two sub-regions in the valve holder merge with one another in step-like fashion or that the outer cylindrical surface of the piston has flat places as recited in claim 31.

Cadman et al (Fig.2) is relied upon by the examiner to teach a valve having a valve holder (33) that is cup-shaped and has two sub-regions of different inside diameters that merge with one another in step-like fashion. The smaller diameter sub-region (35) receives the spring (50) and the larger diameter sub-region embraces and surrounds a portion of the valve insert (30).

Fountain-Baber is relied upon by the examiner to teach a pressure limiting valve having a valve piston (valve member carrier 3) with four flat places distributed uniformly over the outer cylindrical circumference (15) of the valve piston and which extend longitudinally in an axial direction of the valve piston.

The examiner concludes that it would have been obvious to a person of ordinary skill in the art to have provided (a) the valve of Hirota et al with a valve holder having step-like regions receiving the valve insert, as taught by Cadman et al, as an art recognized equivalent substitute valve housing assembly, and (b) a valve piston having flat places inserted into a fluid passage portion of the valve insert, as taught by Fountain-Baber, as an art recognized equivalent substitute fluid passage opening mechanism.

However, claim 31 has been amended to include the limitations of claim 37, namely,

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the valve further comprising *an outflow conduit (1c) in the valve holder (1), wherein the axis (A) of the outflow opening is positioned at an angle relative to the longitudinal axis (A1) of the valve holder (1).*

While Hirota et al disclose (col. 4, ll. 1-3) an outflow conduit (annular passage 22) in the valve holder (seat member 20), the axis of the outflow opening is *not* positioned at an angle relative to the longitudinal axis of the valve holder as claimed in amended claim 31. As clearly shown in Figs. 2 and 3, the axis of the outflow opening of the annular passage (22) extends in the same direction as the longitudinal axis of the valve holder, that is, not at an angle to the longitudinal axis of the valve holder as claimed.

Neither Cadman et al nor Fountain-Baber make up for the shortcomings of Hirota et al since neither reference disclose or suggest an outflow conduit in a valve holder, wherein the axis of the outflow opening is positioned at an angle relative to the longitudinal axis of the valve holder.

Accordingly, even if it had been obvious to combine the teachings of Hirota et al, Cadman et al and Fountain-Baber in the manner suggested by the examiner, one of ordinary skill in the art would not have arrived at the subject specified in applicants' amended claim 31 since neither Cadman et al nor Fountain-Baber disclose or suggest *an outflow conduit in a valve holder, wherein the axis of the outflow opening is positioned at an angle relative to the longitudinal axis of the valve holder.* Thus, the invention is not rendered obvious as required by 35 U.S.C. 103.

As for claims 23, 25, 33 and 34, due to their dependency upon claim 31, the rejection of claims 23, 25, 33 and 34 are not rendered obvious as well.

Claims 37 and 43 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hirota et al (US 6,314,753) in view of Cadman et al (US 2,498,482), Fountain-Baber (US 3,199,533) and Platt et al (US 4,413,646). As stated hereinbefore, claim 31 has been amended to include the limitations of dependent claim 37. Therefore, the following comments regarding claim 37 are applicable to amended claim 31.

On pg. 8 of the Final Rejection, the examiner acknowledges that the combination of Hirota et al, Cadman et al and Fountain-Baber lack an outflow conduit in the valve holder, wherein the axis of the outflow opening is positioned at an angle relative to the longitudinal axis of the valve holder as evidenced by the statement in paragraph 16 that "Hirota et al fails to disclose an outflow conduit at an oblique angle to the longitudinal axis."

Platt et al is relied upon by the examiner to teach a valve comprising a valve holder housing having an oblique outlet in the valve holder housing to reduce erosion of the valve surface. However, the examiner does not identified the structural element(s) in Pratt et al that constitutes the valve holder housing having an oblique outlet.

Nevertheless, the examiner concludes that it would have been obvious to a person of ordinary skill in the art to have provided the valve of Hirota et al with an oblique outlet, as taught by Platt et al, in order to reduce erosion of the valve surface.

This generalization of the teachings of Pratt et al is clearly erroneous. In fact, applicants submit that Pratt et al fail to teach or suggest *an outflow conduit in a valve holder, wherein the axis of the conduit opening is positioned at an angle relative to the longitudinal axis of the valve holder*.

Pratt et al relates to a coal slurry letdown valve used in synthetic fuels processing (col.

3. ll. 22-23). The letdown valve 10 has a body portion 11 with a conduit 13 for the flow of coal slurry into the valve, and a conduit 17 from which coal slurry exists the valve (col. 3, ll. 26-28). A valve piston (plug 25) is movably disposed (arrows 24) in a direction coinciding with the longitudinal axis of the internal bore 31 of the cage 30 and the internal bore 39 of the body portion 11 for controlling the flow of coal slurry across neck 23 of throat 18 of the valve (col. 3, ll. 37-43). Since conduit 17 is the only conduit disclosed in Pratt et al for the outflow of coal slurry from the valve, it clearly is the only conduit that can be read on the claimed outflow conduit. However, as shown in Fig. 1, the axis of the outflow conduit opening is *not* positioned at an angle relative to the longitudinal axis of the valve holder, as recited in amended claim 31, but extends in a direction that coincides with the longitudinal axis of both the internal bore 31 of the cage 30 and the internal bore 39 of the body portion 11. Thus, Pratt et al does not make up for the deficiencies in Hirota et al, as modified by Cadman et al and Fountain-Baber. Therefore, the invention is not rendered obvious as required under 35 U.S.C. 103 since none of the references, individually or combined, disclose or suggest the recited structural arrangements of amended claim 31.

Applicants' comments hereinabove notwithstanding, it is further submitted that combining the teachings of Pratt et al with Hirota et al, Cadman et al and Fountain-Baber, for the purpose suggested by the examiner, would not have resulted in the invention recited in claim amended 31.

Pratt et al teach that to reduce wear of the surface of the flow outlet 17, a removable retainer 20 lined with erosion-resistant material 22 is used (col. 3, ll. 34-36, col. 4, ll. 16-21 and Fig. 1). Thus, if one of ordinary skilled in the art were to actually combine the teachings

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of Hirota et al and Pratt et al for the purpose suggested by the examiner, i.e., reducing erosion of the valve surface, the resulting structure would be a valve comprising an outflow conduit 22 in the valve holder 20, constructed according to the teachings of Hirota et al, that would be lined with a removable wear resistant element 20, as taught by Pratt et al. However, with the inclusion of the removable wear resistant element in the valve holder 20, the valve holder would no longer be a single piece valve holder as required by claim 31. Therefore, based on the examiner's rationale, one of ordinary skill in the art would never have arrived at the subject matter defined in applicants' claim 31. Accordingly, the invention is not rendered obvious as required under 35 U.S.C. 103 for this reason as well.

Applicants additionally submit that the rationale stated by the examiner for combining the teachings of Pratt et al with Hirota et al, Cadman et al and Fountain-Baber is flawed since a person of ordinary skill in the art would not have been prompted to provide the valve of Hirota et al with an oblique outlet, as taught by Pratt et al, in order to reduce erosion of the valve surface.

The invention in Hirota et al relates to a thermostatic expansion valve designed to control the flow rate of refrigerant being introduced into an evaporator. In col. 3., ll. 10-21, Hirota et al disclose that a dust removing filter 11 is attached to the upstream side of the expansion valve to catch impurities, i.e., particulate matter, prior to the refrigerant reaching the restricted passage 22 in spring seat member 20. In other words, rubbish, etc. contained in the refrigerant is held back by the filter 11 and is prevented from flowing into the expansion valve or into the restricted passage 22 (col. 3., ll. 10-21). Thus, Hirota et al is concerned with preventing particulate matter from flowing into the expansion valve and/or the restricted

passage.

On the contrary, Pratt et al is directed to a coal slurry letdown valve for use in a donor solvent coal liquefaction process (col. 1, l. 29). The coal slurry comprises coal particles dispersed in a hydrocarbon mixture. The coal slurry enters the letdown valve at approximately 2000 psi and passes through the throat of the valve where the pressure drops to approximately 80 psi (col. 3, ll. 16-22). The letdown valve is designed with wear resistant surfaces so that the valve can withstand the extreme conditions to which it is subjected (col. 2, ll. 9-15). Thus, Pratt et al is concerned with extending the operating life of the letdown valve (col. 4, ll. 13-15), not with preventing particulate matter from flowing into and through the valve.

On pg. 8 of the Final Rejection, the examiner concludes that one skilled in the art would have been motivated to combine the teachings of Pratt et al with that of Hirota et al in order to reduce erosion of the valve surface in Hirota et al.

However, one skilled in the art would not have been motivated to combine the teachings of Pratt et al with that of Hirota et al, based on the examiner's rationale, since Hirota et al prevents particulate matter from flowing into the restricted passage by using particulate filters. Thus, there would be no need to reduce erosion of the valve surfaces in Hirota et al since the problem of surface wear does not exist in Hirota et al. Therefore, the examiner's rationale for combining the teachings of Hirota et al and Pratt et al does not support a conclusion of obviousness. Accordingly, the invention is not rendered obvious under 35 U.S.C. 103 for this additional reason.

Regarding claim 43, not only is the claim not rendered obvious due to its dependency

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upon claim 31, the claim additionally recites that the conduit is oriented at an oblique angle with respect to the axis of the valve holder. This limitation is neither disclosed nor suggested by the combination of Hirota et al, Cadman et al, Fountain-Baber and Platt et al.

As an aside, claim 43 has been amended as stated previously in the first paragraph of the Remarks. In claim 43, "the bore" has been changed to -- the conduit -- since there was a lack of antecedent basis for -- the bore -- (line 2). Applicants submit that the amendment does not raise any new issues requiring further consideration and/or search since the last three sentences on pg. 4 of applicants' specification clearly point out that the outflow conduit 1c is embodied as a bore. Therefore, either "conduit" or "bore" may be used interchangeably to describe the outflow passageway in the valve holder 1. Thus, regardless of which term is used to specify the outflow passageway in the valve holder, what is clearly evident from applicants disclosure is that the identical feature in the valve holder is being claimed.

Reconsideration of the rejection of claim 26 under 35 U.S.C. 103(a) as being unpatentable over Hirota et al (US 6,314,753) in view of Cadman et al (US 2,498,482), Fountain-Baber (US 3,199,533) and Lauer et al (US 6,523,913) is respectfully requested.

Claim 26 depends from amended claim 31 and includes the limitations of amended claim 31. Lauer et al do not solve the deficiencies in Hirota et al since Lauer et al do not disclose or suggest an outflow conduit in a valve holder, wherein the axis of the outflow opening is positioned at an angle relative to the longitudinal axis of the valve holder as recited in amended claim 31.

Accordingly, even if the examiner's combination of the references may indeed be proper, and it would have been obvious to provided the valve of Hirota et al with calking as a

joining method, as taught by Lauer et al, neither Cadman et al, Fountain-Baber nor Lauer et al, individually or combined, make up for the shortcomings of Hirota et al. Thus, the invention is not rendered obvious as required by 35 U.S.C. 103.

Reconsideration of the rejection of claims 32 and 38 under 35 U.S.C. 103(a) as being unpatentable over Hirota et al (US 6,314,753) in view of Cadman et al (US 2,498,482), Fountain-Baber (US 3,199,533) and Jay et al (US 2,672,881) is respectfully requested.

Claims 32 and 38 depend from amended claim 31 and include the limitations of amended claim 31. Jay et al do not solve the deficiencies in Hirota et al since Jay et al do not disclose or suggest an outflow conduit in a valve holder, wherein the axis of the outflow opening is positioned at an angle relative to the longitudinal axis of the valve holder as recited in amended claim 31.

Accordingly, even if the examiner's combination of the references may indeed be proper, and it would have been obvious to provided the valve of Hirota et al with flat places uniformly distributed over the circumference of the piston and oriented at an angle relative to the longitudinal axis of the piston, and an outlet provided in the valve insert, as taught by Jay et al, neither Cadman et al, Fountain-Baber nor Jay et al, individually or combined, make up for the shortcomings of Hirota et al. Thus, the invention is not rendered obvious as required by 35 U.S.C. 103.

Reconsideration of the rejection of claims 27, 39, 41 and 42 under 35 U.S.C. 103(a) as being unpatentable over Hirota et al (US 6,314,753) in view of Cadman et al (US 2,498,482), Fountain-Baber (US 3,199,533) and Yie (US 5,241,986) is respectfully requested.

Claims 27, 39, 41 and 42 depend from amended claim 31 and include the limitations

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of amended claim 31. Yie does not solve the deficiencies in Hirota et al since Yie does not disclose or suggest an outflow conduit in a valve holder, wherein the axis of the outflow opening is positioned at an angle relative to the longitudinal axis of the valve holder as recited in amended claim 31.

Accordingly, even if the examiner's combination of the references may indeed be proper, and it would have been obvious to provided the valve of Hirota et al with a threaded connection as a joining method, and a piston rod, as taught by Yie, neither Cadman et al, Fountain-Baber nor Yie, individually or combined, make up for the shortcomings of Hirota et al. Thus, the invention is not rendered obvious as required by 35 U.S.C. 103.

Reconsideration of the rejection of claim 40 under 35 U.S.C. 103(a) as being unpatentable over Hirota et al (US 6,314,753) in view of Cadman et al (US 2,498,482), Fountain-Baber (US 3,199,533) and Lindeboom (US 3,346,009) is respectfully requested.

Claim 40 depends from amended claim 31 and includes the limitations of amended claim 31. Lindeboom does not solve the deficiencies in Hirota et al since Lindeboom does not disclose or suggest an outflow conduit in a valve holder, wherein the axis of the outflow opening is positioned at an angle relative to the longitudinal axis of the valve holder as recited in amended claim 31.

Accordingly, even if the examiner's combination of the references may indeed be proper, and it would have been obvious to provided the valve of Hirota et al with a conical spring, as taught by Lindeboom, neither Cadman et al, Fountain-Baber nor Lindeboom, individually or combined, make up for the shortcomings of Hirota et al. Thus, the invention is not rendered obvious as required by 35 U.S.C. 103.

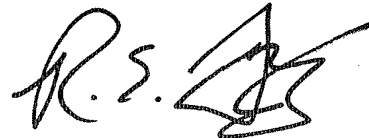
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In view of the amendments to claim 31, as well as the arguments presented hereinabove with respect to amended claim 31, applicants submit that the claims clearly define over the prior art of record.

Entry of the amendment and allowance of the application are respectfully requested.

The Commissioner is hereby authorized to charge any necessary fees in connection with this communication to Deposit Account Number 07-2100.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'R.E. Greigg', with a stylized flourish at the end.

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